CLAIMS

1. A magnetic actuator including a mobile magnetic part (4), a fixed magnetic part (5) and means (6) for triggering the displacement of the mobile magnetic part (4) relatively to the fixed magnetic part (5), characterized in that it includes at least two amagnetic supports (1, 2), placed in different planes, delimiting a gap (3) between them, the fixed magnetic part (5) being integral with at least one of the supports (1, 2), the supports (1, 2) each having an abutment area (10, 20) for the mobile part (4), the abutment area (10, 20) and the fixed magnetic part (5) being distinct, the mobile magnetic part (4) being in levitation in the gap (3) between both supports (1, 2) by means of magnetic guiding due to the fixed magnetic part (4), when it is not abutted against the abutment area (10, 20) of one of the supports (1, 2), and in that the mobile magnetic part (4) is able to assume several stable magnetic positions, in each of these positions, it is abutted against a support (1, 2).

2. The magnetic actuator according to claim 1, characterized in that the mobile magnetic part (4) includes a magnet (40).

3. The magnetic actuator according to any of claims 1 or 2, characterized in that the fixed magnetic part (5) includes at least one magnetic component part (51, 52, 53, 54).

4. The magnetic actuator according to claim 3, characterized in that the magnetic component part is

a magnet.

5. The magnetic actuator according to claim 3, characterized in that the magnetic component part is thermomagnetic.

6. The magnetic actuator according to any of claims 1 to 5, characterized in that the fixed magnetic part includes at least a pair of magnetic component parts ((51, 52), (53, 54)) on a support (1, 2).

7. The magnetic actuator according to any of claims 1 to 6, characterized in that the mobile magnetic part (4) and at least one of the supports (1, 2) include centering means (8) for centering the mobile magnetic part (4) on the abutment area (10, 20) of said support.

8. The magnetic actuator according to claim 7, characterized in that the centering means (8) are substantially bevel-shaped relief features (80, 81), borne both by the support (1, 2) and the mobile magnetic part (4), these relief features (80, 81) having conjugate shapes.

9. The magnetic actuator according to any of claims 1 to 8, characterized in that the fixed magnetic part (5) contributes to delimiting at least one of the abutment areas (10).

10. The magnetic actuator according to any of claims 1 to 9, characterized in that the means (6)

for triggering the displacement of the mobile magnetic part (4) are borne by at least one of the supports (1, 2).

11. The magnetic actuator according to claim 10, characterized in that the means (6) for triggering the displacement of the mobile magnetic part (4) have a magnetic effect.

12. The magnetic actuator according to claim 11, characterized in that the means (6) for triggering the displacement of the mobile magnetic part are heating means (R) capable of changing the magnetic characteristics of the fixed magnetic part (5).

13. The magnetic actuator according to claim 12, characterized in that the means (6) for triggering the displacement of the mobile magnetic part (4) create a magnetic field in the vicinity of the mobile magnetic part (4).

14. The magnetic actuator according to claim 13, characterized in that the means (6) for triggering the displacement of the mobile magnetic part (4) are achieved by at least one conductor (61, 62, 63, 64), in the vicinity of the mobile magnetic part (4), this conductor being able to have an electric current flow through it.

15. The magnetic actuator according to claim 14, characterized in that it includes means (65, 66, 67) for controlling the current to be caused to flow into the conductor (61, 62, 63, 64), by the position of

the mobile magnetic part (4) so that it may assume a plurality of stable positions in levitation.

16. The magnetic actuator according to any of claims 1 to 9, characterized in that the means (6) for triggering the displacement of the mobile magnetic part are pneumatic or hydraulic means (f).

17. The magnetic actuator according to any of claims 1 to 16, characterized in that the fixed magnetic part (5) is made in a material selected from the group of soft magnetic materials, hard magnetic materials, materials with hysteresis, superconducting materials, diamagnetic materials, these materials being taken alone or combined.

18. The magnetic actuator according to any of claims 1 to 17, characterized in that the magnetization of the fixed magnetic part (5) and the magnetization of the mobile magnetic part (4) are pointing in a same direction.

19. The magnetic actuator according to any of claims 1 to 18, characterized in that at least one abutment area (10) includes a pair of electrical contacts (C1, C2) and in that the mobile magnetic part (4) includes at least one electrical contact (C), the mobile magnetic part (4) moving to connect both electrical contacts (C1, C2) of the pair of contacts when it abuts against the abutment area (10).

20. The magnetic actuator according to any of claims 1 to 18, characterized in that at least one

of the supports (1, 2) includes a fluid (f) inlet port (7) in the abutment area (10).

21. The magnetic actuator according to any of claims 1 to 18, characterized in that the mobile magnetic part (4) includes a mirror (50) intended to pass through a slot (501) of one of the supports (1).

22. The magnetic actuator according to any of claims 1 to 21, characterized in that the supports (1, 2) are made on the basis of semiconducting material, dielectric material or conducting material, these materials being taken alone or combined.

23. A matrix of magnetic actuators characterized in that it includes a plurality of magnetic actuators according to any of claims 1 to 22, these magnetic actuators sharing at least one same support (1).

24. A method for making a magnetic actuator, characterized in that it includes the following steps:

on a first amagnetic substrate (90), making a sacrificial frame (910) along the contour of a base (41) of a mobile magnetic part (4),

depositing a first dielectric layer (92) on the first substrate (90) and making at least a casing (93) able to receive a fixed magnetic part (51, 52),

depositing in the casing (93) the fixed magnetic part (51, 52),

depositing a second dielectric layer (94) on the first dielectric layer (92) and making casings (95, 96) able to receive the mobile magnetic part (4) and at

least one conductor (61, 62) of the means (6) for triggering the displacement of the mobile magnetic part (4),

depositing in the casings (95, 96) the mobile magnetic part (4) and the conductor (61, 62),

etching in the dielectric layers (92, 94) one or several trenches (97) reaching the sacrificial frame (910),

assembling the first substrate (90) turned upside down onto a second amagnetic substrate (100, 120) in order to delimit a gap (3) between both substrates (90, 100) this gap (3) being for displacing the mobile magnetic part (4),

etching the first substrate (90) and removing the sacrificial frame (910) in order to release the mobile magnetic part (4) and the base (41).

25. The method according to claim 24, characterized in that the gap (3) is formed by means of at least one spacer (111) inserted between the first and second substrate at the moment of assembly.

26. The method according to claim 24, characterized in that the gap (3) is formed by beads (112) in a meltable material, inserted between the first and second substrate at the moment of assembly and by annealing said beads (112) after assembly.

27. The method according to any of claims 24 to 26, characterized in that it includes, before assembling both substrates (90, 100), a step for making in a first dielectric layer (101) on the second substrate (100), at least one casing (102) able to

receive the fixed magnetic part (53, 54),

depositing in the casing (102) the fixed magnetic part (53, 54),

depositing a second dielectric layer (103) on the first dielectric layer (101) and making at least one casing (104) able to receive at least one conductor (63, 64) of the means (6) for triggering the displacement of the mobile magnetic part (4),

depositing in the casing (104) the conductor (63, 64).

28. The method according to any of claims 24 to 27, characterized in that it includes a step for magnetizing the mobile magnetic part (4) and optionally the fixed magnetic part (5) before the step for releasing the mobile magnetic part (4).

29. The method according to any of claims 24 to 28, characterized in that the first substrate (90) is tapered before the step for etching the first substrate, the etched part having a mirror (50) function.

30. The method according to any of claims 24 to 29, characterized in that the first substrate (90) is made on the basis of semiconducting or dielectric material.

31. The method according to any of claims 24 to 30, characterized in that the second substrate (100) is made on the basis of semiconducting or dielectric material.